MIDDLE ILLINOIS RIVER ECOSYSTEM ANALYSIS,

WILDLIFE REPORT

The following wildlife information is important for future decisions in the Middle Illinois River watershed. This information pertains to meeting ecosystem management objectives for maintaining and restoring healthy ecosystems. Healthy ecosystems provide for the needs and wants of people from National Forest and Bureau of Land Management administered lands.

The amended Siskiyou Forest Plan requires ecosystem analysis at a watershed scale prior to implementation of many activities on Forest Service and Bureau of Land Management administered lands. ‘‘*Watershed analysis will be the mechanism to support ecosystem management...[it] will focus on collecting and compiling information within the watershed that is essential for making sound management decisions...*It will serve as the basis for developing project-specific proposals, and determining monitoring and restoration needs for a watershed The information...will contribute to decision making at all levels...NEPA planning will use information developed from watershed analysis.’’ (ROD, E-20).

‘‘*The results of watershed analyses may include a description of the resource needs, issues, the range of natural variability, spatially explicit information that will facilitate environmental and cumulative effects analyses to comply with NEPA regulations, and the processes and functions operating within the watershed. Watershed analysis will identify potentially disjunct approaches and conflicting objectives within the watershed.’’* (ROD, E-20).

The amended Siskiyou Forest Plan is one more step in America’s desire to improve how we treat the land while using natural resources that people need and want. This plan focuses on using an ecosystem management strategy to meet the needs of people and maintain and improve habitat for species whose viability are, or may be, at risk. The northern spotted owl, marbled murrelet, and ‘‘listed’’ or potentially ‘‘listed’’ fish were the primary foundation for this plan. Maintenance and restoration of these habitat elements is the focus of the amended Siskiyou Forest Plan standards and guidelines and land allocations.

Analysis conducted for the amending the Siskiyou Forest Plan considered a one hundred year time period using land allocations and standards and guidelines to assure viability for a host of mature and old growth, aquatic, and riparian species. Although a one hundred year period was used to determine viability risks, the life of a forest plan is generally about ten to fifteen years. Therefore, although only about 7% of the Siskiyou National Forest is currently managed for timber outputs (Matrix), the long-term future is uncertain for this plan. The future of habitat elements important for viability of many late successional and aquatic/riparian-associated species is also uncertain. Furthermore, the amended Siskiyou Forest Plan focus is limited and does not include analysis of habitats like younger forest, meadows, pine oak savannas, rock outcrops and others that are important to viability of many species and, therefore, sustainable ecosystems.

Ecosystem analysis at the watershed scale is expected to identify locations for restoration and maintenance projects and to further the ecosystem management objectives of the Siskiyou Forest Plan as amended by the NW Forest Plan. The ultimate goal for ecosystem management is to assure sustainable outputs, for people, by restoring and maintaining sustainable ecosystems. Because maintaining species viability (keeping all the parts) is important to sustainable ecosystems, and healthy ecosystems are important to human prosperity, wildlife habitat management is consequential to people.

The goal of this section of the Middle Illinois River Ecosystem Analysis is to furnish information that can be used to provide for the needs of wildlife while people use natural resources for our benefit.

The core questions used to focus this wildlife portion of Middle Illinois River ecosystem analysis:

1. What is the existing condition, what was the historic condition, what is the trend, and what is the desired future condition for:
   - The relative abundance and distribution of wildlife species of concern that are important in the watershed (e.g. threatened or endangered species, special status species, species emphasized in other plans).
   - The distribution and abundance of their habitats.
   - The processes that affect changes to these species and their habitats?

2. What are the road network and road maintenance needs for managing habitats for species of concern?

3. Where are the priority areas for wildlife maintenance and restoration treatments?

4. What and where are the conflicts between various resources in terms of treatment recommendations? How can recommendation conflicts be mitigated or minimized?

Analysis of Key Questions

Key Question #1. What is the existing condition, what was the historic condition, what is the trend, and what is the desired future condition for:

- **The relative abundance and distribution of wildlife species of concern that are important in the watershed (e.g. threatened or endangered species, special status species, species emphasized in other plans).**
- **The distribution and abundance of their habitats.**
- **The processes that affect changes to these species and their habitats?**

Species of Concern

Of the more than 200 vertebrate and thousands of invertebrate wildlife species that might be in the Middle Illinois River watershed, the wildlife species of concern are:

- Species federally listed as ‘‘proposed, endangered or threatened’’ by the Endangered Species Act.
- Species listed as Sensitive by Region 6 or Region 5 of the USDA Forest Service.
- Species identified as ‘‘survey and manage, needing more analysis,’’ or ‘‘management indicator species’’ by the Siskiyou Forest Plan as amended by the NW Plan.

Although distribution and abundance of species of concern and locations of individuals are important for managing species, a large DATA GAP exists for most animals (Appendix I, Table S-1). Except for a handful of ‘‘listed’’ species, almost nothing is known about wildlife distribution and abundance in this watershed. Systematic surveys for a few species have been conducted, primarily in past project areas, and data about other species comes primarily from incidental sightings. Location information is important for maintaining wildlife that are threatened with extinction, such as peregrine falcons and northern spotted owls, because human activities that may have negative affects on nesting success can be avoided during breeding season. Northern spotted owls are known to nest in the Middle Illinois River watershed.

Although location information is important to management activities near some species, habitat management has the greatest affect on all species. If adequate habitat for species of concern is not present in the watershed, these species will not be there. Conversely, if conditions they need are present, species of concern could occur in the watershed. Adequate habitat is a function of identifying appropriate habitat elements to measure, and determining the distribution (where) and abundance (how much) that is necessary for meeting the needs of wildlife. Although neither the appropriate habitat elements nor the distribution and abundance is known for all the species of concern, a considerable amount is known. Wildlife research has identified a host of habitat elements that wildlife need, and analysis can shed light on the distribution and abundance of these elements in the watershed.

Habitat Elements

Habitat associations for wildlife species of concern in the Middle Illinois River watershed were identified using information from Management of Fish and Wildlife Habitats of Western Oregon and Washington (Brown et. al., 1985) and the Siskiyou Forest Plan as amended by the NW Forest Plan. Habitat components that the species of concern are associated with are: grass/forb, shrub, seedling/sapling/pole, young forest, mature forest, old growth forest, caves & burrows, cliffs & rims, large down wood, snags, talus, and riparian/aquatic (Appendix I, Table S-2a).

Habitats with the most vertebrate species of concern using them as primary habitat are:

- riparian/aquatic (18 species)
- old growth forest (17)
  - Interior mature and old growth forest, as well as large trees with deformities - such as cavities, witch’s brooms, and large limbs - are also identified as important wildlife habitat characteristics by the NW Forest Plan (see Appendix I, Table S-2b).
- mature forest (11)

- snags (15)
- large down wood (11)

Maintaining the appropriate distribution and abundance of these habitats is critical for meeting the wildlife goals of the Siskiyou Forest Plan as amended by the NW Forest Plan.

The amended Siskiyou Forest Plan standards and guidelines focus heavily on the habitat elements listed above and determined viability of many mature and old growth and aquatic species is not at risk if the plan is followed. However, the amended Siskiyou Forest Plan also identifies many species whose viability are in question, and need more analysis. It also recognizes this plan is only one more step in America's desire to manage resources in the best way possible, and that through watershed analysis more steps can be taken. For example, the NW Plan (NW Plan FSEIS, pg. G-9) identifies potential future changes when it states: The situation for [northern spotted] owls could be made more secure if favorable habitat conditions could be spread more evenly through the landscape [than the distribution identified by Late Successional Reserves]. Such a solution could be made possible if it can be demonstrated that silvicultural techniques can create and maintain suitable conditions while harvesting timber...''

Many species require habitats that are not emphasized by Standards and Guidelines from amendments (NW Forest Plan) to the Siskiyou Forest Plan. A narrow focus on riparian, mature and old growth, snags, and down wood would not be the best possible management of our ecosystems, and could lead to viability problems for other species. Emphasis on a limited set of habitat components may benefit associated species but many other species could suffer. Furthermore, many animals that need the habitat components emphasized by the NW Plan also need other components to meet their life history needs. *The aim of the wildlife portion of this ecosystem analysis is to identify important habitat elements and recommend actions for maintaining and restoring them within their natural/historic range of variability.*

Disturbance

The process of disturbance on habitat elements has profound effects on species distribution and abundance, and therefore ecosystem sustainability. Disturbances, especially fire, have changed the distribution and abundance of these habitat elements for millennia, and species are adapted to this natural range of variability. In fact, some species require disturbance. For example, ancient pine and Douglas fir trees reached large sizes because periodic low intensity fires removed competing vegetation.

Forest Ecosystem Management Assessment Team - FEMAT - (1993, p. II-98) states:

> "Change happens. Change is an inevitable and necessary attribute of biological systems. Species have evolved in an environment characterized by change, sometimes gradual as in succession, and sometimes sudden as in catastrophic storms or fires or as caused by human activities."

To provide the needs of wildlife species of concern, the range of changing conditions that they are adapted to should be sustained. The species of today are the result of their adaptations to the past, and their survivability can only be assured if the conditions they are adapted to are present. Understanding the conditions which species have survived over the past few hundred years is important, because the survival of species probably depends upon the presence of these conditions.

For deriving a first approximation of the natural range of habitat variability, analysis focused on attempting to understand how much habitat components have changed. Disturbance and site productivity influence these habitat elements. Site productivity is influenced heavily by climate and geology. Climate (especially available moisture) and geology (parent material for soil) have the greatest influence on a site's ability to produce these habitat elements. Good soil and high moisture availability combine to produce abundant vegetation and a high amount of vegetation produces many animals. Forest types of the Siskiyou National Forest were stratified into plant series that reflect how weather and soil parent material effect site productivity and how fire disturbance effects each plant series (Atzet and Wheeler, 1984).

There are about 35,600 acres or 55 % of Forest Service administered lands in the watershed that are low productivity soils; i.e., ultramaphic serpentine, (see geology map). Except for under-growth development, these serpentine areas have not been changed much (e.g., by timber harvest), nor have they grown much since around 1940. Also, serpentine does not support old growth forest. Therefore, serpentine areas are not considered when modeling historic conditions. In other words, it is assumed that existing forest conditions on serpentine are similar to historic conditions for modeling purposes.

Although the species of concern identified in this document have not been associated with plant series, the ability to produce important habitat components has. For example, the Jeffrey pine plant series (found on serpentine) does not normally produce big trees (over 32" d.b.h.) or canopy closure greater than 60%, for ‘‘old growth forest’’ but it does create conditions that produce many rare plants.

Maintaining a desirable range of variability for important habitat elements is dependent upon maintaining the effects of disturbance similar to the effects of past disturbances. Managing for conditions in the middle portion of the range of variability for any given habitat element is recommended (Atzet, personal communication, 1997). Analysis cannot completely define ranges, but approximations can be made. Modification of these ‘‘approximations’’ is expected to occur in the future as better information is obtained. The recommended ‘‘desired ranges’’ acknowledge that many extreme fluctuations of distribution and abundance of habitat elements are responses to factors outside human control; like climate change and severe fire weather conditions, they will happen regardless of our efforts.

Table 1: First Approximation of Desired Condition for Wildlife Habitat Components
(Using Information from Middle Illinois River and Other Ecosystem Analyses).

Habitat Components	Reference/Desired Condition-non serpentine (from other ecosystems)
Big Trees/Old Growth (>32"d.b.h. (old growth definition, FEMAT pg. IX-24)) Data from Stair Creek, East Fork Illinois River, Althouse Creek, Stair Creek, and Sucker Creek (non-serpentine).	40% of area dominated by big trees
Big Trees (>32"d.b.h.) in Riparian Reserves (class 1-3 streams) Stair Creek, East Fork Illinois River, Althouse Creek, Stair Creek, and Sucker Creek (non-serpentine).	45% of area dominated by big trees
Mature (21-32" d.b.h.) and Old Growth (>32"dbh) conifer and hardwood	45-75% of landscape (REAP) with 75% in LSRs (pg. 36, SW Oregon LSR Assessment); at the stand scale, 8-16 mature trees, 8-16 old growth trees per acre., and numerous hardwoods at stand scale (Bingham and Sawyer, 1991)
Interior Mature and Old Growth (non-serpentine) conifer and hardwood (19%- Althouse, 25% Caves & Grayback, 35% Indigo, and Stair 49%)	25-35%
Small conifer and hardwood (9-21"dbh)	20%
Seed/Sap/Pole (<9"dbh)	Maintain 20% of area in forage for deer and elk (Siskiyou LRMP) and 180 other associated species (Brown 1985). Much of this 20% would be from seed-sap-pole; however, meadows and under-burned mature and old growth would also contribute if overstory canopy closure is reduced and/or canopy gaps are present.
Grass/Forb openings and forest understory	2% and (DATA GAP concerning understory coverage)
Cliffs, Rock outcrops, Caves, and Talus	Maintain as undisturbed areas
Dead Wood: Large Woody Material and Snags	Meet Standards and Guidelines from amended Siskiyou Forest Plan as described in "Guidelines for Harvest Prescriptions; Large Woody Material, Green Tree Retention, [and] Wildlife Reserve (Snag) Tree Retention (14 Nov. 1996).
Pine/Oak Savanna	Restore as much s possible.

Table 2: Habitat Components in Middle Illinois River Watershed (non-serpentine)
(For more detailed information on these habitat variables see Appendix, Tables S-1, S-2a, & S-2b][For modeling assumptions, see Appendix, Table MA, Modeling Assumptions).

Habitat Components	Current Condition; Middle Illinois River	Reference Condition: Middle Illinois River
	PMR Pixel Data	Modeled PMR Pixel Data To Pre-Harvest Condition
Non-Forest	steady state	Steady state
Grass/Forb	670 ac. or 2 % ***See map*** Special Wildlife Sites (from MA9's)	DATA GAP
Shrub Dominated		
Seed/sap/pole (<9"dbh)	3860 ac. or 14 % ***See map*** current size/structure	9884 ac. or 35 % ***See map*** historic size/structure
Young Forest (9-21" d.b.h.)	7090 ac. or 25 % ***See map*** current size/structure	5358 ac. or 19 % ***See map*** historic size/structure
Mature Forest (21-32" d.b.h.)	10519 ac. or 37 % ***See map*** current size/structure	4903 ac. or 17 % ***See map*** historic size/structure
Old Growth (> 32" d.b.h.)	6052 ac. or 21 % ***See map*** current size/structure	7434 ac. or 26 % ***See map*** historic size/structure
Interior Older Forest (Mature and Old Growth patches larger than 20 ac.)	1041 ac. or 16 % ***See map*** current interior mature and old growth forest habitat	12247 ac. or 19 % ***See map*** historic interior mature and old growth forest habitat
Cliffs, Rock outcrops, Caves, and Talus	Sometimes impacted by rock pit and road development. Also impacted by timber harvest effects on microclimate, esp. on talus. Fire suppression has increased stand densities, therefore may have increased humidity on talus microclimate.	Were essentially undisturbed except for some fire impacts.
Dead Wood: Large Woody Material and Snags	Reduced amounts of high concentrations of class 1 & 2 pieces of dead wood due to fire suppression, fire salvage, and timber harvest. The landscape may have more background levels of dead wood over the watershed due to fire suppression preventing consumption by frequent fires, especially older (class 3+) down wood.	Historic conditions are unknown. Reference conditions were established using Eco-plot data and used to establish Direction for the Siskiyou National Forest for different plant series' "Guidelines for Harvest Prescriptions; Large Woody Material, Green Tree Retention, [and] Wildlife Reserve (Snag) Tree Retention (14 Nov. 1996).
Pine/Oak Savanna	Most of the areas with pine/oak savannas are nearly gone, due to heavy encroachment by Douglas fir and other vegetation. Many pines, especially the big ones, are dead or dying. Some large black oaks and white oaks remain among encroachment but will likely be dead within ten or twenty years.	Historically, this habitat was limited in the watershed. This habitat is maintained by frequent natural and many human caused fires on productive soils.

Table 3: Habitat Components – Forest Size/Structure - In Riparian Reserves

See maps: historic condition of forests in Riparian Reserves and current condition of forests in Riparian Reserves. (For modeling assumptions, see Appendix, Table MA, Modeling Assumptions).

Habitat Components	Riparian Reserves: Current Condition (PMR), Middle Illinois River. (% figures below are % of Riparian Reserve Acres for all serpentine and non-serpentine)	Riparian Reserves: Desired/Reference Condition (PMR): Middle Illinois River. (% figures below are % of Riparian Reserve Acres for all serpentine and non-serpentine)
	Classes 1,2,&3; 14486 ac. or 22% of WA	
Grass/Forb	DATA GAP	DATA GAP
Shrub Dominated		
Seed/sap/pole	934 ac or 15 % of RResv. ***See map*** current condition of forests in Riparian Reserves	2286 ac or 37 % of RResv. ***See map*** historic condition of forests in Riparian Reserves
Young Forest (9-21" d.b.h.)	1442 ac or 23 % of RResv. ***See map*** current condition of forests in Riparian Reserves	1124 ac or 18 % of RResv. ***See map*** historic condition of forests in Riparian Reserves
Mature Forest (21-32" d.b.h.)	2402 ac or 39 % of RResv. ***See map*** current condition of forests in Riparian Reserves	1272 ac or 20 % of RResv. ***See map*** historic condition of forests in Riparian Reserves
Old Growth (> 32" d.b.h.)	1423 ac or 23 % of RResv. ***See map*** current condition of forests in Riparian Reserves	1565 ac or 25% of RResv. ***See map*** historic condition of forests in Riparian Reserves

Table 4: Trends for Habitat Components

(Assumes continued successful fire suppression, which becomes less likely as more time passes and fuels increase)

Habitat Components	Trend: Past 100 Years	Trend: Future 100 Years For Various Siskiyou NF Land Allocations Under Current Land Management Plan (Amended Siskiyou Forest Plan).
Grass/Forb	Large areas lost to tree encroachment in meadows and mature and old growth areas. Until the past five to ten years, fall burning of clearcuts created good conditions for grasses and forbs. Cooler spring burns of the recent past do not create favorable conditions for this habitat element.	Same as past 100 years except some meadows will be restored.
Shrub Dominated	Shrub dominated areas reduced by tree encroachment.	Reduced from trend as trees grow into larger size classes. Trend will continue
Pole/Sapling	Increased by timber harvest and fire suppression.	Reduced from trend as trees grow into larger size classes.

Habitat Components	Trend: Past 100 Years	Trend: Future 100 Years For Various Siskiyou NF Land Allocations Under Current Land Management Plan (Amended Siskiyou Forest Plan).
Pine/Oak Savanna (provide food for more animal species than any other plants (Martin, Zim and Nelson(1951)	Most of the areas with pine/oak savannas have been heavily encroached by Douglas fir and other trees. Most pines, especially the big ones, are dead or dying. Some large black oaks and white oaks remain among encroachment but most will likely be dead within ten or twenty years.	Restoration may occur if funding is available.

The following table, Table 5, Key Findings, uses reference conditions from other watersheds to determine the desired future condition for the Middle Illinois ecosystem. Other watersheds were used because the reference/historic conditions that can be reasonably modeled and checked against aerial photos, about 1940, were heavily influenced by mining activities in the watershed and may not represent a condition within the average range of historic variability.

Table 5: Key Findings:
Amount Needed To Restore Habitat Components To Desired/Reference Condition

Habitat Components	Current Condition	Desired/Reference Condition	Amount Needed to Restore to Desired Condition
	Acres and % of FS administered lands in the Middle Illinois River Watershed ''Capable'' of growing Old Growth forest (not serpentine)		
Grass/Forb	Much less than the past. Amount is a DATA GAP	Meadows & brushfields restored and grass/forb & shrub abundance increased in forested habitats. Amount is a DATA GAP	DATA GAP
Shrub Dominated			
Pole/Sapling	3860 ac. or 14 % ***See map*** current size/structure	4281 ac. or 15 %	-421 ac. or –1 %
Young Forest	7090 ac. or 25 % ***See map*** current size/structure	4281 ac. or 15 %	-2809 ac. or -10 %
Mature Forest - 21-32'' d.b.h. -(8-16 trees per acre)	10519 ac. or 37 % ***See map*** current size/structure	5709 ac. or 20 %	-4810 ac. or -17 %
Old Growth - >32'' d.b.h. – (8-16 trees per acre)	6052 ac. or 21 % ***See map*** current size/structure	11417 ac. or 40 %	5365 ac. or 19 %
Interior Mature and Old-Growth	1041 ac. or 16 % ***See map*** current interior mature and old growth forest habitat	19476 ac. or 30 % in large well-connected patches.	9075 ac. or 14 % of WA. Restoration is a function of location; i.e., proximity to exiting interior habitat. The total amount of acres that need treated could be less, if treatments are at the proper locations, or more, if not at proper locations.
Riparian Reserve, Grass/Shrub	DATA GAP	DATA GAP	DATA GAP
Riparian Reserve, Pole/Sapling	934 ac or 15 % of RResv. ***See map*** current condition of forests in Riparian Reserves	620 ac or 10% of RResv.	-314 ac or –5 %
Riparian Reserve, Young Forest	1442 ac or 23 % of RResv. ***See map*** current condition of forests in Riparian Reserves	930 ac or 15 % of RResv.	-512 ac or –8 %
Riparian Reserve, Mature Forest - 21-32'' d.b.h. -(8-16 trees per acre)	2402 ac or 39 % of RResv. ***See map*** current condition of forests in Riparian Reserves	1240 ac or 20 % of RResv. ***See***	-1162 ac or –19 %
Riparian Reserve, Old Growth - >32'' d.b.h. – (8-16 trees per acre)	1423 ac or 23 % of RResv. ***See map*** current condition of forests in Riparian Reserves	2790 ac or 45% of RResv.	1367 ac or 22 %
Cliffs, Rock outcrops, Caves, and Talus	Developed rock pits and reduction of micro-climate by timber harvest have degraded habitat quality	Minimize disturbance of sites.	DATA GAP
Dead Wood: Large Woody Material and Snags	Below desired condition in many managed stands	See Siskiyou Guidelines	Meet Siskiyou Guidelines
Pine/Oak Savanna (provide food for more animal species than any other plants (Martin, Zim, and Nelson, 1951)	Heavily encroached by undesirable trees and brush. ***See map*** existing Special Wildlife Sites	Healthy pines and deciduous oaks with grass/forb understory	All places where this habitat occurs

Table 6: Recommendations for Maintenance and Restoration of Habitat Elements

Habitat Components	Recommendations
Grass/Forb	Underburn young, mature, and old growth forests. Burn regeneration harvest units hot enough to provide a seed bed for grasses and forbs. Restore and maintain meadows and pine/oak savannas. Use native species when seeding disturbed areas. Numerous meadow restoration opportunities exist. See the following map (Middle Illinois River Wildlife Sites)
Shrub Dominated	Use prescribed fire to maintain brushfields, and use fire and/or mechanical treatment to maintain shrubs in portions of managed stands.
Seed/Sap/Pole	Grow large trees. Use timber harvest (regeneration or widely spaced thinning) and prescribed natural fire. Extend the time which seed-sap-pole habitat provides grass, forb, and shrub habitat for 180 associated species (Brown et al. 1985) with manual release and pre-commercial thinning treatments; priority areas are winter range (i.e., south aspects with < 40% slope) see map south aspects with < 40% slope.
Young Forest (9-21'' d.b.h.)	Grow large trees. Reduce potential fire intensity by reducing ground and understory fuels, increasing the distance to overstory crown, and reducing the density of overstory crown to reduce crown fire potential (Agee 1997). Maintain hardwoods. Priority areas are driest portions of Riparian Reserves, next to roads (fire and economics), and adjacent to interior mature and old growth stands (especially those occupied by nesting spotted owls), see map current size/structure.
Mature Forest (21-32'' d.b.h.) Old Growth Forest (>32" d.b.h.) Interior Mature and Old Growth (400ft. edge effect)	At the watershed scale, manage for 45-75% mature and old growth, with around 40% of this as old growth. In Riparian Reserves, manage for 45-80% mature and old growth forest habitat, with around 45% old growth. At the stand scale, manage for 8-16 mature conifers per acre, 8-16 old-growth trees per acre, and the appropriate amount of hardwoods (Bingham and Sawyer, 1991). A significant amount of the large trees should have deformities such as cavities, large limbs, and witch's brooms (from mistletoe). Priority restoration areas are 1- mature, 2- young, and 3- seed-sap-pole forest habitats that are adjacent to interior mature and old-growth forest (see map current interior mature and old growth forest habitat) or within Riparian Reserves. The objective is to increase connectivity and size of interior patches. Commercial thinning and then underburning should, in the short term, help to maintain these areas; and in the long term hasten restoration of mature and old-growth habitat (Agee, 1997). Priority areas to prevent stand replacement fires are within interior mature and old growth habitat patches, esp., the largest patches (see map current size/structure). Treatments could include underburning when conditions are appropriate, and suppression of fire when burning conditions are too intense (see map Fire Hazard).
Cliffs, Rock outcrops, Caves, and Talus	Maintain the majority as undisturbed areas; survey for species like peregrine falcon, bats, and Del Norte salamander prior to disturbance.
Dead Wood: Large Woody Material and Snags	Meet Siskiyou Guidelines. Manage for low amounts next to ridgeline roads, where the chances for stopping wildfires are best. In Riparian Reserves, manage around high end of range for most areas, and beyond for some areas. In LSRs, manage around the mean for most areas, and beyond for some areas. In Matrix, manage around the mean for most areas and below in some areas; e.g. south aspects.
Pine/Oak or Pine Savanna (provide food for more animal species than any other plants (Martin, Zim and Nelson(1951)	Reduce encroachment. Maintain savannas, after removing encroachment, by burning as frequently as needed (about every 5 years). Priority locations are anywhere this habitat is found.

Key Question #2. What are the road network and road maintenance needs for managing habitats for species of concern?

Road network and maintenance needs for managing habitats are DATA GAPS. A major concern is the need for road access to young, especially managed stands, that need commercially thinned to grow big trees faster to restore old growth forest and interior mature and old growth forest habitats. See list of proposed road treatments.

Key Question #3. Where are the priority areas for wildlife maintenance and restoration treatments?

Table 7: Fire Risk to Habitats That Need Maintained/Restored

Fire Risk	Low		Moderate		High	
	(ac. & % of habitat type on FS in WA)					
	Ac	%	Ac	%	Ac	%
Seed/sap/pole forest habitat	2104	11	10826	58	5721	31
Young forest habitat	6296	44	5970	42	2077	14
Mature forest habitat	5580	32	10874	62	1165	7
Old growth forest habitat	1950	26	5255	71	199	3
Interior mature & old growth forest habitat	4638	36	7604	59	605	5

See maps; fire risk, current interior mature and old growth forest habitat, and current size/structure for potential locations of treatments in this priority order: high fire risk to interior mature and old growth, old growth, mature, and young forests; and moderate fire risk to interior mature and old growth, old growth, mature, and young forests.

Key Question #4. What and where are the conflicts between various resources in terms of treatment recommendations? How can recommendation conflicts be mitigated or minimized?

Table 8: Potential Conflicts

Conflicts between Treatment Recommendations	How Conflicts may be Mitigated or Minimized
Recommendations to treat roads that make them not driveable could create conflicts (at some locations) with recommendations to reduce stand densities and manage fire (prescribed and wild fire). The primary reason for this conflict is economics; i.e., mechanical thinning of small trees with limited commercial value requires road access to facilitate thinning that is economically viable.	Stand density treatments: • Mechanical treatment of trees with small economic value: reduce stand densities before eliminating road access, especially in Late Successional and Riparian Reserves. Thin to a wide spacing, which facilitates rapid growth to a size that would contribute to the most rapid development of old growth forest habitat possible. Treat roads to minimize adverse affects to water quality and aquatic habitats until the road can be eliminated. • Mechanical treatment of trees with no economic value; road access reduces the cost of treatment, but road access is not needed. Thin to a wide spacing. • Prescribed and wildfire management; identify roads that are critical to success and treat these roads to minimize their adverse affects on water quality and aquatic habitats.
The goal of the Siskiyou Forest Plan to maintain 20% of the area in pioneer seral habitat for associated species (deer and elk) is in conflict with land allocations in the watershed. Deer and elk are indicator species for other species associated with grass, forb, and shrub habitats.	Improve the conditions for forage plants in small, mature, and old growth forest habitat by reducing tree densities in stands. Maximize the quality of forage in timber harvest units.

Conflicts between Treatment Recommendations	How Conflicts may be Mitigated or Minimized
Recommendations in the Siskiyou Forest Plan to retain a minimum of 40% soil duff and litter (Standard and Guideline 7-4, pg. IV-44, 1989) may be a conflict with recommendations to underburn and burning hot enough to create suitable conditions for high quality forage. Essentially, soil duff and litter retention recommends low amounts of exposed mineral soil and conditions for high quality forage may require high amounts of exposed mineral soil.	Research the source of this S&G; (i.e., Regional Guidelines), and confirm whether it is directed at prescribed fires in regeneration harvest areas or prescribed fires in all areas. Also, describe historic range of variability for soil duff and litter distribution and abundance prior to effective fire suppression. These are ***DATA GAPs***.
Recommendations to restore the distribution of mature and old growth forest habitat to desired/reference conditions could be in conflict with the distribution of Late Successional Reserve land allocations; i.e., the distribution of LSRs may not reflect historic distribution of mature and old growth forest habitat.	Historically, the distribution of mature and old growth habitat was patchier than the distribution of Late Successional Reserves in the watershed. If mature and old growth habitat is restored in the entire area of these reserves, the distribution of mature and old growth may not be within the range of historic variation. Furthermore, maintaining mature and old growth on dry aspects within Late Successional Reserves may be difficult or impossible. However, this is a long-term issue and, in the short term, restoration could be focused on wetter aspects.
The recommendation to maintain old growth size trees; i.e., over 32'' d.b.h., may be in conflict with timber management objectives in Matrix and the restoration of giant (>45'' d.b.h.) trees in the watershed.	Although part of the definition for old growth forest includes trees greater than 32'' d.b.h., trees larger than this are most important to species that need large trees for nesting or denning; e.g., northern spotted owl (*Strix occidentalis*) and black bear (*Ursus americanus*). Impacts to species associated with large trees could be reduced if trees larger than 45'' d.b.h. are not planned for harvest until old growth has been restored within the historic range of variability in the watershed. In some situations, the stand density of trees around 32'' d.b.h. may need to be reduced to promote the development of giant trees.

APPENDIX
SPECIES OF CONCERN AND THEIR HABITAT ASSOCIATIONS

Table S-1: Species Distribution and Abundance in this watershed, current

Key to Table S-1: ESA = Endangered Species Act; NWP J2 = Northwest Forest Plan Appendix J2; ROD = Record of Decision for NWP; R6 = Region 6 of USDA Forest Service; R5 = Region 5 of USDA Forest Service; mgmt. Indicator = species used as indicators of effects from management practices.

COMMON NAME	SPECIES OF CONCERN: why?	PRESENT: yes, no or unknown	DISTRIBUTION: % of suitable habitat surveyed in watershed	ABUNDANCE: % of watershed population surveyed
Peregrine falcon	ESA-endangered	yes	< 1%	<1%
Bald eagle	ESA-threatened	yes	<1%	<1%
Marbled murrelet	ESA-threatened	no	<1%	0
Northern spotted owl	ESA-threatened	yes	>75%	>75%
Olympic salamander	NWP-J2; additional analysis needed	unknown	< 1%	< 1%
Clouded salamander	NWP-J2; additional analysis needed	unknown	< 1%	< 1%
Tailed frog	NWP-J2; additional analysis needed	unknown	< 1%	< 1%
Common merganser	NWP-J2; additional analysis needed	unknown	< 1%	< 1%
Wolverine	R5&6-sensitive	unknown	< 1%	< 1%
Osprey	R6-mgmt. Indicator	potential at Illinois River	<1%	< 1%
Lewis' woodpecker	R6-mgmt. Indicator	likely	< 1%	< 1%
Acorn woodpecker	R6-mgmt. Indicator	likely	< 1%	< 1%
Red-breasted sapsucker	R6-mgmt. Indicator	likely	< 1%	< 1%
Williamson's sapsucker	R6-mgmt. Indicator	likely	< 1%	< 1%
Downy woodpecker	R6-mgmt. Indicator	likely	< 1%	< 1%
Hairy woodpecker	R6-mgmt. Indicator	likely	< 1%	< 1%
White-headed woodpecker	R6-mgmt. Indicator	unlikely	< 1%	< 1%
Northern flicker	R6-mgmt. Indicator	likely	< 1%	< 1%
Pileated woodpecker	R6-mgmt. Indicator	likely	< 1%	< 1%
Roosevelt elk	R6-mgmt. Indicator	resident	>30%	< 1%

COMMON NAME	SPECIES OF CONCERN: why?	PRESENT: yes, no or unknown	DISTRIBUTION: % of suitable habitat surveyed in watershed	ABUNDANCE: % of watershed population surveyed
Columbian black-tailed deer	R6-mgmt. Indicator	yes	>30%	< 1%
Black- backed 3-toed woodpecker	R6-mgmt. Indicator; NWP-J2; additional analysis	unknown	<1 %	< 1 %
Marten	R6-mgmt. Indicator; R5-sensitive	unknown	<1 %	< 1 %
Red-legged frog	R6-sensitive	unknown	<1 %	< 1 %
Western pond turtle	R6-sensitive	unknown	<1 %	< 1 %
Common kingsnake	R6-sensitive	likely	<1 %	< 1 %
California mountain kingsnake	R6-sensitive	yes	<1 %	< 1 %
Townsend's big-eared bat	R6-sensitive	unknown	<1 %	< 1 %
White-footed vole	R6-sensitive	unknown	<1 %	< 1 %
Red tree vole	ROD-survey&mg.	likely	<1 %	< 1 %
Pallid bat	ROD-survey&mg.	unknown	<1 %	< 1 %
Silver-haired bat	ROD-survey&mg.	unknown	<1 %	< 1 %
Long-eared myotis	ROD-survey&mg.	unknown	<1 %	< 1 %
Fringed myotis	ROD-survey&mg.	unknown	<1 %	< 1 %
Long-legged myotis	ROD-survey&mg.	unknown	<1 %	< 1 %
Great Grey owl	ROD-survey&mg.; R5-sensitive	unknown	<1 %	< 1 %
Del Norte salamander	ROD-survey&mg.; R6-sensitive	yes	<1 %	< 1 %
Siskiyou Mountains salamander	ROD-survey&mg.; R6-sensitive	unknown	<1 %	< 1 %

Habitats for Wildlife Species of Concern

The following tables (S-2a and S-2b) identify major known habitat components that the species of concern require. It is important to focus on habitat variables that are known to be important for many species and variables people can do something about. This focus will facilitate analysis and subsequent management recommendations that are understandable and reasonable for integrating with other disciplines for implementation. If analysis is so complex that understandable and reasonable management

recommendations cannot be made, improved management may not be realized from this analysis.

Information from Management of Fish and Wildlife Habitats of Western Oregon and Washington (Brown et. al., 1985) And the Siskiyou Forest Plan as amended by the Northwest Forest Plan was used to compile tables S-2a and S-2b. These tables depict species habitat associations for wildlife species of concern in the Middle Illinois River ecosystem.

Table S-2a: Wildlife Species of Concern, Habitat Associations

Wildlife Habitat Associations	GRASS/FORB	SHRUB DOMINATED	POLE/SAPLING FOREST	YOUNG FOREST	MATURE FOREST	OLD GROWTH FOREST	CAVES & BURROWS	SLIFFS & RIMS	LARGE DOWN WOOD	SNAGS	TALUS	RIPARIAN/AQUATIC
COMMON NAME	1= Primary Habitat 2= Secondary Habitat											
Peregrine falcon	2	2			2	2		1		2	2	1
Bald eagle	1				2	2				1		1
Marbled murrelet					2	1						2
Northern spotted owl					2	1				2		
Olympic salamander			2	1	1	1					1	1
Clouded salamander	1	1	1	1	2	2			1	2	2	
Tailed frog	2	2	1	1	1	1			1		2	1
Common merganser					1	1			2	1		1
Wolverine							1		1		1	1
Osprey					2	2				1		1
Lewis' woodpecker	2	1	1		2	2			1	1		
Acorn woodpecker			2		2	2			2	1		
Red-breasted sapsucker			2	2	2	2				1		1
Williamson's sapsucker			2	2	2	2				1		
Downy woodpecker			2	2	2	2				1		1

Wildlife Habitat Associations	GRASS/FORB	SHRUB DOMINATED	POLE/SAPLING FOREST	YOUNG FOREST	MATURE FOREST	OLD GROWTH FOREST	CAVES & BURROWS	SLIFFS & RIMS	LARGE DOWNWOOD	SNAGS	TALUS	RIPARIAN/AQUATIC
COMMON NAME	1= Primary Habitat 2= Secondary Habitat											
Hairy woodpecker			2	2	2	1			1	1		2
White-headed woodpecker				2	2	1			2	1		
Northern flicker	1	2	2		1	1			1	1		2
Pileated woodpecker				2	2	1			1	1		2
Roosevelt elk	1	1	1	1	1	1						1
Columbian black-tailed deer	1	1	1	2	2	2			2			2
Black- backed 3-toed woodpecker			2	2	2	2				2	1	2
Marten			2	2	1	1	2	2	1	1	2	2
Red-legged frog	2			2	2	2						1
Western pond turtle	1	1							1			1
Common kingsnake	1	1	2	2					2		2	
California mountain kingsnake		1	1	1	2	2			2			1
Townsend's big-eared bat		2	1	2			1					2
White-footed vole		2	2	2	1	1			1			1
Red tree vole				2	2	2						2
Pallid bat	1		1	2	2	2	1	1		2		1
Silver-haired bat	2		1	2	2	1	2	2		1		2
Long-eared myotis			2	2	1	1	2		1			1
Fringed myotis	1	1			2	2	1	1		2		1
Long-legged myotis	2	1	1	2	1	1	1	1		1		1
Great Grey owl												
Del Norte salamander				1	1	1			2		1	
Siskiyou Mountains salamander			2	1	1	1			2		1	2
TOTAL NUMBER OF PRIMARY USERS	9	9	10	7	11	17	5	4	11	15	5	18
TOTAL NUMBER OF SECONDARY USERS	6	5	13	18	22	16	3	2	8	6	5	9

There are 38 vertebrate wildlife species of concern identified in table S-1. Table S-2 identifies habitats important for these species. These habitats are grass/forb, shrub,

seedling/sapling/pole, young forest, mature forest, old growth forest, caves & burrows, cliffs & rims, large down wood, snags, talus, and riparian/aquatic. ***Habitats with the most vertebrate species of concern using them as primary habitats are riparian/aquatic (18 species), old growth forest (17), snags (15), large down wood (11), and mature forest (11).***

Amendments (NW Forest Plan) to the Siskiyou Land and Resource Management Plan identify habitat for many riparian and old growth associated species with more detail than shown in Table S-2a (see the following table, Table S-2b).

Table S-2b: Habitat Components of Species Associated with Late Successional and Old-Growth Forest (from the NW Forest Plan).

Wildlife Habitat Associations with Late Successional and Old Growth Habitats (from NW Forest Plan)							
Species/ Guilds	LS/OG (large saw/ old growth)	Riparian	Snags	Down Woody Material	Large Green Trees	Canopy Closure	Unique Habitats
Northern spotted owl (FSEIS 3&4, pg. 234+)	large patches	yes	yes	yes	yes	yes	
Marbled Murrelet (FSEIS 3&4, pg. 246+)	trees>32''d.b.h. w/nesting platforms				trees>32''d.-b.h. w/nesting platforms		
Bald Eagle (FSEIS pg. 206+)	nest				nest trees		large water, i.e., rivers and lakes
Peregrine Falcon (FSEIS, pg. 254+)							cliffs; often forages in forest
Invertebrates: Arthropods (FSEIS, pg. 2-75)	extensive and inter-connected	yes	yes	yes	yes; diversity of old growth	yes; canopy structure	
Invertebrates: Mollusks (FSEIS, pg. 2-76)	LS/OG influences quality of moist habitats	moist forest, i.e.; springs, bogs, marshes					talus: basalt and limestone
Amphibians (FSEIS, pg. 2-76)	Extensive and inter-connected. LS/OG influences quality of cool moist habitats	low sediment, cool water, and head-water streams		yes			

Wildlife Habitat Associations with Late Successional and Old Growth Habitats (from NW Forest Plan)							
Species/ Guilds	LS/OG (large saw/ old growth)	Riparian	Snags	Down Woody Material	Large Green Trees	Canopy Closure	Unique Habitats
Birds (FSEIS, pg. 2-76&77)	large reserves	yes	yes	yes	green trees, large and small		
Bats (FSEIS, pg. 2-77)	yes	yes	yes	yes			
Mammals – other than bats- (FSEIS, pg. 2-77)	yes: some species, like fisher, may need large unfragmented expanses of LS/OG	yes	yes	yes	yes	Some need high amounts; e.g., fisher, marten, and tree voles	

Table MA: Modeling Assumptions

Habitat Components	Current Condition; Middle Illinois River	Historic/Reference Condition: Middle Illinois River	
	PMR pixel data: Size Structure Codes	Modeled PMR pixel data to pre-harvest condition : Size/Structure Codes	1950 Timber Inventory: Size Codes (n/a to this analysis)
Non-Forest			38
Grass/Forb			2, 23!, 29!, U
Shrub Dominated			
Seed/sap/pole (<9"dbh)	10, 11, 20, 23, 27, 30, 33, 35, 36, 37, 38	10, 11, 12, 20, 23, 24, 27, 30, 33, 35, 36, 37, 38	10, 13, 16, 22, 24, 26A, 28_5, 28B, 30, 37
Young Forest (9-21" d.b.h.)	12, 13, 24	13, 14, 15, 21, 22, 28, 39	4, 9, 9A, 9B, 12A, 12B, 15A, 15B, 19A, 19B, 21, 25, 26, 28A, 31
Mature Forest (21-32" d.b.h.)	14, 15, 16, 21, 22, 25, 28, 39	16, 25	6, 8, 11, 14, 17, 17IC, 18, 20, 20_5, 20A, 23, 27, 27_5, 29, 31_5
Old Growth (> 32" d.b.h.)	17, 18, 19, 26, 29, 31, 32, 34	17, 18, 19, 26,29, 31, 32, 34	
Interior Older Forest (Mature and Old Growth patches larger than 20 ac.)	Combined Mature and Old Growth and subtracted 400 ft. from the outside edge of stands for ''edge effect.'' The remaining area is ''interior habitat.''	Combined Mature and Old Growth and subtracted 400 ft. from the outside edge of stands for ''edge effect.'' The remaining area is ''interior habitat.''	

* = General modeling assumptions using PMR pixel data to develop ‘‘pre-harvest condition’’ data -

Before timber harvest:

All current regeneration harvest areas were old growth,
Unmanaged forests of old growth were old growth,
Unmanaged mature forests were young forests,
Unmanaged young forests were pole forests, and
Unmanaged seed/sap/pole forests remained the same.
Other unmanaged habitats, (i.e., water, rock, grass, shrub) remained the same.

It is difficult to model pre-harvest conditions for young and seed/sap/pole stands; therefore, PMR historic/reference information for these size classes has limited value. For more precise information about these assumptions, see the data dictionary for this data.

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